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17 August 1959

*file Balloon, Port. H<sub>2</sub>, etc.*

## MEMORANDUM FOR THE RECORD

SUBJECT: Full Scale Test of Balloon, Portable Hydrogen Generator

1. On 12 August the undersigned visited  to witness a test of the full scale portable hydrogen generator. This unit is designed to produce 250 pounds of lift from 100 pounds of Sodium Borohydride ( $\text{NaBH}_4$ ). This corresponds to a volume of 3500 cubic feet of hydrogen at standard conditions. This test was designed to prove out calculations of catalyst quantities needed for cold weather generation.

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2. The test was scheduled to begin at 0700 and at 0715 the catalyst was poured into the sodium borohydride solution. Reaction time was scheduled for 45 minutes, the actual time was  $13\frac{1}{2}$  minutes. A special balloon was inflated with the evolved hydrogen and the lift measured was 267.75 pounds. This must be regarded as an approximate figure since the gas is saturated with water and water was streaming out of the base of the balloon at the time of measurement. A reasonably accurate weigh off was made since the water was allowed to run into the balloon gondola (thus the system weight was unchanged) and the weather was ideal with almost no wind.

3. Pertinent test data is as follows:

Amount of water	250 gal.
Weight of $\text{NaBH}_4$	100 lbs.
Temp of water at start	$35.6^\circ \text{F}$
Amount of catalyst used	23.0 lbs. in 5 gal. of water
Reaction time	13.5 minutes
Rise in temperature	$120.4^\circ \text{F}$
Total lift immediately after test	267.75 lbs.

4. The test is regarded as a complete success although some disappointment must be registered at the failure to predict the reaction time accurately. This time has been the subject of extensive work and it must be admitted that the reason it cannot be predicted is because the actual reaction that takes place is not fully understood. The error is on the favorable side and  $13\frac{1}{2}$  minutes more than meets the requirements, the problem would be the lack of certainty that the time would be longer.  feels certain that it will not but since the time is not accurately predicted now a shadow is cast over some otherwise excellent R&D work.

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5. Future work on the Balloon Portable Hydrogen Generator is as follows:

- (a)  will write a final report 25X1
- (b) The balloon at  will be modified according to new requirements discovered at the test. No additional funds will be required. 25X1
- (c) The films will be edited and consolidated for briefing purposes.
- (d) If training films are needed the generators can be used with bottled gas in a mock up of the actual operation. Work of this type will be undertaken only upon request.
- (e) Operational interest will be solicited and the R&D work considered completed.



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